

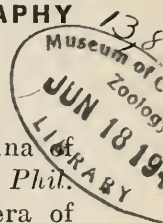
THE LEPIDOPTERA OF THE HEBRIDEAN ISLES OF COLL, TIREE AND GUNNA, WITH SOME REMARKS ON THE BIOGEOGRAPHY OF THE ISLANDS.

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As a result of our pre-war investigations in the flora and fauna of the Hebrides, there appeared in May 1939 (*Proc. Univ. Durham Phil. Soc.*, X, 10-23) a preliminary paper dealing with the Lepidoptera of Coll and other members of the Scottish Western Isles. Despite the unfavourable circumstances, our researches have continued during the war period, and various notes detailing important records, and discussing interesting biological facts, have been published in the entomological and other scientific journals. Amongst these many have dealt with the biota of the Coll-Tiree group. In particular, in a note in the *Entomologist's Record*, LV, p. 27, I ventured to make certain deductions based in part on Coll and Tiree insects, concerning the origin and development of Hebridean plant and animal life. Lately, in preparing a lengthy contribution on the biogeography of the Inner and Outer Hebrides, to be published shortly, the whole of the facts there set out, with many others, have been subjected to critical revision, and I have seen no reasons whatever for altering my earlier views. In my opinion, in Coll and Tiree, as well as in the Outer Isles and the Rhum, Eigg, Muck and Canna series, there exist two main floristic and faunistic components. One of these I regard as Eu-Hebridean and endemic, inasmuch as it has been evolved in the Hebridean region from immigrants reaching the area at a period of high land level. This occurred either in the last Interglacial period or in late glacial times during that time of amelioration when the Palaeolithic Aurignacean culture flourished (i.e. in the Zone II of Jessen). The second element, diverse in its content and including the American forms and others of more southern proclivities, I picture as entering Coll and Tiree (or what then represented them!) at a stage of low sea levels in Preboreal or early Boreal times (Zone V and the initial Portions of Zone VI of Jessen).

Recently (1945), Ford, in his "Butterflies," has put forward views on the origin of the British Rhopalocera. From these I am in almost complete disagreement, so doubtful do many of them appear in the light of known facts. More especially is this so in the case of his pronouncements about the Hebridean fauna on page 320 of his book. These result from an almost total neglect of much recent, and pertinent, geological and other investigations. He seems completely unaware of the fact that in late glacial times, when the second 100 foot raised beach marked the level of the Hebridean sea, Coll and Tiree were practically awash, and at most represented by a series of isolated, rocky skerries, incapable of maintaining more than very limited and specialized forms of life. In my mind, this demands, with complete rigidity, when due cognizance is taken of the present Coll and Tiree biota, an inflow of plants and animals from all directions in Preboreal or Boreal times. This, in turn, necessitates post-glacial land connections between the island group on the one hand and the Outer Isles, the Rhum series, and the mainland of Scotland and Ireland on the other.

In this paper, therefore, in order to supplement the evidence of the flora, it is proposed to bring together a list of the Lepidoptera of Coll,



Tiree and Gunna. Thus other workers will have material upon which to formulate their own conceptions on the course of events giving rise to the present populations of the islands concerned.

Pieris brassicae, L.; *P. rapae*, L. Casual immigrants, the former often plentiful.

P. napi, L. Common on Coll and Gunna, but quite rare on Tiree; in both broods in a form calling for no special remarks.

Aglaia urticae, L. Common on all three islands.

Nymphalis io, L. Sparingly in the Breachacha area of Coll.

Vanessa cardui, L.; *V. atalanta*, L. Also frequent immigrants, and not rare in some years.

Argynnis aglaia, L. Of fairly common occurrence locally on Coll is the ab. *scotica*, Watk., although signs of admixture with the mainland form are discernible.

A. selene, L. A little dark form is widespread on Coll; this is, of course, f. *insularum*, Harrison.

Euphydryas aurinia, Rott. In Tiree on a secluded marshy strip supporting the Devil's Bit Scabious in the An Cnap area; very abundant on similar ground on Gunna. All the individuals caught approximated the Irish form *praeclara*.

Eumenis semele, L. Well distributed on the sand dunes on Coll and Gunna. The form, which agrees racially with examples collected on Sandray, Pabbay, and Vatersay in the Outer Isles and in Rhum and elsewhere in the Inner Hebrides, is separable from mainland examples by its brighter and more contrasty colouration. In particular, the under surface of the wings is blacker and the yellow portions more orange. This insect may be known as subsp. **atlantica**, the type, in my possession, originating in Vatersay.

Maniola jurtina, L. Throughout all three islands, particularly on the margins of the sand dunes in a brilliant form of subsp. *splendida*, B. White, agreeing in general with Outer Island and Canna specimens.

Coenonympha tullia, Müll. Only on the Isle of Coll, more especially around the lochs as in the case of Lochs Cliad and its neighbours; always as subsp. *scotica*, Stgr., and of free occurrence.

C. pamphilus, L. Widely distributed on the islands from May to August.

Callophrys rubi, L. Attached to heather and bilberry on Coll, chiefly in the areas south east and north west of Arinagour.

Polyommatus icarus, Rott. Depends chiefly upon *Lotus corniculatus* and *Trifolium repens*, and is therefore found in abundance on the dunes. As the former plant occurs also on rock ledges, and amongst heather, colonies of the Common Blue are encountered on the drier moorlands and in sunny gorges. Racially, like Outer Island examples, the population belongs to subsp. *clara*, Tutt. The insect flies on all three islands from May until August.

Laothoe populi, L. Ova, larvae and imagines captured on *Salix aurita* and aspen on Coll; in the absence of aspen, and the extreme rarity of Salices on Tiree scarcely likely to be noted there.

Cerura furcula, L. Larvae from *Salix aurita* at the north east end of Coll.

C. vinula, L. In some plenty on Coll; generally distributed wherever sallow and aspen grow.

Clostera pigra, Hufn. On Eilean Ornsay, lying off Coll. S.E. of Arinagour.

Tethea or, Fab. Larvae not rare on aspen; Coll only.

Lasiocampa quercus, r. *callunae*, Palmer. Of frequent occurrence on Coll moorlands.

Macrothylacia rubi, L. Not rare in Coll and Gunna.

Saturnia pavonia, L. On all heather lands on Coll.

Spilosoma lubricipeda, L. Along ditches, chiefly in the Gallanach area, Coll.

S. lutea, Hufn. Sparingly, Arinabost Farm, Coll, and Scarinish, Tiree.

Phragmatobia fuliginosa, L. Larvae on Coll late in the season; imagines at Salum in Tiree, as well as at Cornaigmore on Coll and on Gunna.

Parasemia plantaginis, L. Fairly general on Coll; Salum on Tiree. The form *hospita* is present.

Arctia caja, L. Far from rare; on all three islands.

Apatele menyanthidis, View. Larvae on Salix, Erica, Calluna and Myrica on Coll.

A. euphorbiae var. *myricae*, Gn. Larvae on Myrica along Loch Cliad, Coll.

A. rumicis, L. A general feeder, but preferring Iris on Gunna and Coll.

Euxoa tritici, L. On ragwort in the dunes.

Lycophotia varia, Vill. Amongst heather on Coll.

Actebia praecox, L. Larvae in quantities on the exposed roots of Marram grass on the shores of Vaul Bay, Tiree.

Amathes agathina, Dup. Larvae on heather on Coll.

A. glareosa, Esp. Also collected as larvae on Coll.

A. baja, Fab. A few behind Arinagour, Coll, at ragwort.

A. xanthographa, Fab. Common in its duller varieties on ragwort, Coll.

Diarsia brunnea, Fab. Larvae on various low plants; Arinagour and Gallanach, Coll.

Triphaena comes, Hb. Types, var. *rufa*, Tutt, var. *rufa-nigrescens*, Tutt were bred freely from larvae taken at several points on Coll; the same forms were captured on ragwort on the hill behind Arinagour.

T. pronuba, L. Many forms bred and captured on Coll and Tiree.

T. ianthina, Esp. Types and var. *virgata*, Harrison on Coll.

Ceramica pisi, L. Larvae on Coll and Gunna.

Cerapteryx graminis, L. Abundant on Coll and Gunna.

Bombycia viminalis, Esp. Larvae beaten from sallow on Coll.

Apamea monoglypha, Hufn. Common enough everywhere, with melanic forms.

A. secalis, L. Also quite plentiful and generally distributed.

Procus strigilis, L. At rush and other flowers on Coll.

P. versicolor, Borkh. At ragwort, Arinagour, Coll; three Hebridean islands, Raasay, Rhum, and Coll, have now produced this insect, first discovered by us in the British Isles ten years ago.

Celaena haworthii, Curt. Taken casually near Loch a' Mhill Aird, Coll.

Hydroecia lucens, Frey. Not rare, around Loch, Eatharna, Coll.

H. crinunensis, Burrows. Well distributed on Coll.

H. micacea, Esp. Common on ragwort, Coll.

Coenobia rufa, Haw. Taken once, flying in the setting sun, Loch Cliad, Coll.

Arenostola pygmina, Haw. Also captured singly on Coll.

Stilbia anomala, Haw. Drumm Flishaig, along the cliff supporting the big juniper, Isle of Coll.

Caradrina clavipalpis, Scop. Common on flowers on Coll.

Amphipyra tragopogonis, L. Abundant on ragwort, Arinagour, Coll.

Cerastis rubricosa, Fab. In the red var. *rufa*, and the pale form *pallida* at sallow catkins in spring on Coll.

Orthosia gothica, L. Vars. *rufescens*, Tutt, and *pallida*, Tutt, on Coll, with intermediates.

O. stabilis, View. Parallel forms to the preceding; likewise taken at sallow on Coll.

O. incerta, Hufn. In small numbers in the paler forms on Coll; one beautiful mottled red and white female was obtained.

O. gracilis, Fab. The commonest of the genus on Coll; the vars. *pallida*, Tutt, and *rosea*, Tutt, prevail; larvae are not uncommon in spun meadowsweet heads on Gunna.

Agrochola lota, Cl. Larvae beaten from *Salix aurita* on Coll early in June.

Anarta myrtili, L. Larvae on heather on Coll.

Phytometra viridaria, Cl. Found in some numbers in several stations on Coll where milkwort was common.

Polychrysis moneta, Fab. Larvae very scarce on monkshood at Arinagour, Coll.

P. gamma, L. Common as an immigrant on all three islands.

Abrostola tripartita, Hufn. Occurs freely wherever *Urtica dioica* colonies exist on Coll.

Hypena proboscidalis, L. Not rare but somewhat local on Coll and Tiree.

Scopula ternata, Schr. Scattered on the Coll heaths from Bousd to Arileod.

Ortholitha chenopodiata, L. In a very richly coloured form between Breachacha and Kilbryde, Coll.

Anaitis plagiata, L. Far from rare on Coll, especially in sheltered rocky places; also on Gunna.

Eulype subhastata, Nolcken. Larvae not rare on Myrica on the Loch edges between the Machair Mor and Loch Cliad on Coll.

Lygris testata, L. Common enough on Coll and Gunna.

Cidaria fulvata, L. Larvae in abundance on the Burnet Rose on rocks north of Loch Cliad.

Dysstroma truncata, Hufn. In small quantities on Coll and Gunna; the var. *commanotata* on Gunna.

D. citrata, L. Plentiful everywhere on Coll and Gunna.

Lyncometra ocellata, L. On the moors of Coll.

Chloroclysta miata, L. Larvae on Salices and birch on Coll.

Thera cognata, Thnb. Beaten as larvae at all points where juniper grows on Coll; most common near Loch a'Mhill Aird.

T. juniperata, L. With the preceding as the var. *scotica*.

Xanthorhoe designata, Rott. Occasionally on Coll.

X. montanata, Bkh. Probably more abundant on Coll and Tiree than our records show.

X. fluctuata, L. In small numbers near Scarinish, Tiree; the form is quite dark.

Epirrhoe alternata, Müll. On the Tiree sand dunes at Kilkenneth, on the Crossapol and Gallanach dunes on Coll; only the form *obscurata*, described from the Outer Isles, occurs.

Colostygia salicata, Hb. Near Ruaig on Tiree.

C. multistrigaria, Haw. Not common on Coll in April.

C. didymata, L. In a rather dark form on Coll, Tiree and Gunna.

Euphyia bilineata, L. Abundant as var. *atlantica*, Stgr. on all three islands.

Perizoma albulata, Schiff. Common on Coll; the ab. *hebudium*, Weir, is present, with intermediates between it and the type, on dunes and moors.

Hydriomena furcata, Thnbg. Larvae not rare on willow and hazel, Coll only.

Operophtera brumata, L. Very local; found only on *Prunus spinosa* behind Coll Church on the moorland.

Eupithecia goossensiata, Mab. Not common amongst heather.

E. castigata, Hb. As the preceding.

E. nanata, Hb. Quite common on the moorlands.

Abraxas grossulariata, L. Very common in sheltered heathery places; feeds on *Calluna*, *Erica*, *Corylus* and *Salix*.

Cabera pusaria, L. Amongst birch on Coll.

C. exanthemata, Scop. Amongst willow and birch; rarer than its ally.

Crocallis elingvaria, L. Larvae obtained from birch on the Dairy Loch, Coll.

Alcis repandata, L. A few greyish specimens near Friesland, Coll.

Gnophos obscurata, Schiff. A single example on the cliff face near Hyne, Coll.

Nyssia zonaria, Schiff. In very great numbers; on Coll on the dunes from Crossapol to Sorisdale, but invading cultivated land at Torasta; on the dunes on Gunna and from Bharrapol to Salum on Tiree. Only the small subspecies *atlantica*, Harrison, occurs.

Ematurga atomaria, L. Very dark examples are to be taken everywhere.

Zygaena purpuralis, Brun. In small numbers on Gunna.

Z. flipendulae, L. Somewhat rare in rocky gorges on Coll; plentiful on the moors, and rarer on the dunes on Gunna.

Hepialus humuli, L. Common and quite typical near Scarinish, Tiree.

Peronea variegana, Schiff. Plentiful on hawthorn, Breachacha, Coll.

Depressaria nervosa, Haw. Common opposite Eilean Ornsay on Coll, where the food plant, *Oenanthe crocata*, grows on the beach.

Phlyctaenia fuscalis, Schiff. On heather moors, Coll and Gunna.

Pyrausta purpuralis, L. Rarer than the last-named insect and in the more rocky places.